



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/750,567 | 12/26/2000 | Edmund J. Mozeleski | 99B065/2 | 6491 |

7590 08/27/2002

ExxonMobil Chemical Company
P.O. Box 2149
Baytown, TX 77522-2149

[REDACTED] EXAMINER

OH, TAYLOR V

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 1625 | [REDACTED] |

DATE MAILED: 08/27/2002

[REDACTED]

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|------------------------------|---------------------|
| Office Action Summary | Applicant No. | Applicant(s) |
| | 09/750,567 | MOZELESKI ET AL. |
| | Examiner Taylor Victor Oh | Art Unit 1625 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 06 March 2001.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-35 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-35 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

| | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>3 and 4</u> . | 6) <input type="checkbox"/> Other: _____ . |

Claim Rejections - 35 USC § 112

Claims 1 and 2 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for THF and methyl tert-butyl ether as examples of an ether, does not reasonably provide enablement for all the ethers. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to include all the ethers unrelated to the invention commensurate in scope with these claims.

because the specification, while being enabling for methyl pivalate, ethyl pivalate, isopropyl pivalate, TBP, NPP, and neopenytyl glycol mono pivalate as examples of an ester, does not reasonably provide enablement for all the esters. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to include all the esters unrelated to the invention commensurate in scope with these claims.

because the specification, while being enabling for ethylene, propylene, isoolefins, butanes, and C₅ to C₁₈ olefins as examples of an olefin, does not reasonably provide enablement for all the olefins. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to include all the olefins unrelated to the invention commensurate in scope with these claims.

because the specification, while being enabling for methanol, n-propanol, n-butanol, 2-propanol, 2-ethyl hexanol, isohexanol, isoheptanol, isoctanol, isononanol,

Art Unit: 1625

3,5,5-trimethyl hexanol, isodecanol, isotridecanol, 1-octanol, 1-decanol, 1-dodecanol, 1-tetradecanol, and the mixtures as examples of an alcohol, does not reasonably provide enablement for all the alcohols. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to include all the alcohols unrelated to the invention commensurate in scope with these claims.

Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 3, a term "normal butanes" is mentioned. However, it does not describe what normal butanes are meant in the claim. An appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

Art Unit: 1625

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jung et al (U.S. 4,311,851) in view of Takahashi et al (U.S. 4,894,188).

Jung et al (U.S. 4,311,851) teaches a preparation of carboxylic acid esters with BF_3 alcohol complex catalyst (see col. 1 , lines 1-4) as well as the recovery and recycle of BF_3 alcohol complex catalyst used in the carbonylation of olefins such as ethylene and propylene to produce carboxylic acid esters by reacting ethylene and propylene with carbon monoxide(see col. 1 , lines 50-52) in the presence of the catalyst prepared in using ratios of from 0.75 to 2 moles of boron trifluoride per an alcohol (see col. 3 , lines 1-2). Furthermore, when a less than one mole of the boron trifluoride is employed, the catalyst is a mixture of $\text{BF}_3 \cdot \text{CH}_3\text{OH}$ and $\text{BF}_3 \cdot 2 \text{CH}_3\text{OH}$ (see col. 3 , lines 2-5). Moreover, the reaction may be performed at a temperature of from 0° to 100° C. (see col. 2 , lines 28-29) at a pressure of from 10 to 300 atmospheres (see col. 3 , lines 53-55); also, for the separating purpose of the methyl isobutyrate and methanol

Art Unit: 1625

distillate, the operating temperature ranges are from 50⁰ to 200⁰ C. (see col. 6 ,lines 34-45). In addition, it is recommended to use solvents having from 6 to 20 straight or branched carbon atoms (see col. 3 ,lines 34-37) for the process.

The instant invention, however, differs from the reference in that the olefin is isobutene, a molar ratio of ROH: BF₃ is from 1.6 :1 to 4:1, the use of methyl-t-butyl ether is not mentioned, and the product composition contains less than 3% by weight carboxylic acid.

Takahashi et al teaches a process of producing fatty acids or their derivatives by reacting an olefin such as isobutylene (see col. 2 ,line 25), carbon monoxide , and water or reacting an alcohol or its derivative such as methyl-t-butyl ether (MTBE) and carbon monoxide in the presence of hydrogen fluoride catalyst (see col. 2 , lines 7-11). Moreover, the reaction products containing pivalic acid and methyl pivalate are prepared from n-butylene, i-butanol, t-butanol, methyl –t-butyl ether or diisobutylene in the presence of hydrogen fluoride as the catalyst (see col. 4, lines 18-22). Furthermore, the reference does indicate that an acid catalyst such as sulfuric acid , hydrogen fluoride, and boron trifluoride may be used extensively in the reaction process (see col. 1 , lines 17-21).

With respect to the molar ratio of ROH: BF₃ from 1.6 :1 to 4:1, the Jung et al does teach the preparation of carboxylic acid esters with BF₃ alcohol complex catalyst prepared in using ratios of from 0.75 to 2 moles of boron trifluoride per an alcohol; in other words, the molar ratio of ROH: BF₃ is from 1.3 :1 to 1: 2. The claimed ranges and

Art Unit: 1625

prior art do not overlap but are so close that one skilled in the art would have expected to have the similar reaction condition in the absence of an unexpected result; a *prima facie* case of obviousness may be overcome by a showing of the unexpected result.

Concerning the product composition contained less than 3% by weight carboxylic acid, the reference is silent. However, the Jung et al does indicate indirectly that 6% of impurities containing carboxylic acid is obtained by reviewing the passages of Example 1 in which all of the propylene is converted and the selectivity to methyl isobutylate is 94 % (see col. 7 ,lines 27-29). Therefore, it is possible that ,as a result of the process, the product composition may contain less than 3% by weight carboxylic acid by routine experimentations.

Jung et al is directed to the preparation of carboxylic acid esters by the olefin with carbon monoxide in the presence of the BF_3 alcohol complex catalyst. Takahashi et al expressly teaches the process of producing the methyl pivalate either by the reaction process using isobutylene or methyl-t-butyl ether (MTBE) with carbon monoxide in the presence of the BF_3 catalyst; they are equivalent during the process. Therefore, it would have been obvious to the skillful artisan in the art to have motivated to employ methyl-t-butyl ether (MTBE) as a starting material for the preparation of methyl pivalate as an alternative because both references are directed to the production of carboxylic acid esters.

Claims 24-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al (U.S. 4,894,188) in view of Jung et al (U.S. 4,311,851).

Takahashi et al teaches a process of producing their derivatives of fatty acids by reacting an olefin such as isobutylene (see col. 2 ,line 25), carbon monoxide , and water or reacting an alcohol or its derivative such as methyl-t-butyl ether (MTBE) and carbon monoxide in the presence of hydrogen fluoride catalyst (see col. 2 , lines 7-11). Moreover, the reaction products containing pivalic acid , methyl pivalate, isononanoic acid, or the like are prepared from n-butylene, i-butanol, t-butanol, methyl -t-butyl ether or diisobutylene in the presence of hydrogen fluoride as the catalyst (see col. 4, lines 18-22). Furthermore, the reference does indicate that an acid catalyst such as sulfuric acid , hydrogen fluoride, boron trifluoride or the like may be used extensively in the reaction process (see col. 1 , lines 17-21).

The instant invention, however, differs from the reference in that the acid composition containing the molar ratio of ROH: BF_3 is from 2 :1 to 4:1, methyl-t-ether is in contact with phosphoric acid, and the molar ratio of methyl pivalate to nonanoic methyl esters is 4 or greater.

Jung et al teaches a preparation of carboxylic acid esters with BF_3 alcohol complex catalyst (see col. 1 , lines 1-4) as well as the recovery and recycle of BF_3 alcohol complex catalyst used in the carbonylation of olefins such as ethylene and propylene to produce carboxylic acid esters by reacting ethylene and propylene with carbon monoxide(see col. 1 , lines 50-52) in the presence of the catalyst prepared in using ratios of from 0.75 to 2 moles of boron trifluoride per an alcohol (see col. 3 , lines 1-2). Furthermore, when a less than one mole of the boron trifluoride is employed, the catalyst is a mixture of $\text{BF}_3\cdot \text{CH}_3\text{OH}$ and $\text{BF}_3\cdot 2 \text{CH}_3\text{OH}$ (see col. 3 , lines 2-5).

Art Unit: 1625

Moreover, the reaction may be performed at a temperature of from 0⁰ to 100⁰ C. (see col. 2 , lines 28-29) at a pressure of from 10 to 300 atmospheres (see col. 3 , lines 53-55); also, for the separating purpose of the methyl isobutyrate and methanol distillate, the operating temperature ranges are from 50⁰ to 200⁰ C. (see col. 6 ,lines 34-45). In addition, it is recommended to use solvents having from 6 to 20 straight or branched carbon atoms (see col. 3 ,lines 34-37) for the process.

With respect to the molar ratio of ROH: BF₃ from 2 :1 to 4:1, the Jung et al does teach the preparation of carboxylic acid esters with BF₃ alcohol complex catalyst prepared in using ratios of from 0.75 to 2 moles of boron trifluoride per an alcohol; in other words, the molar ratio of ROH: BF₃ is from 1.3 :1 to 1: 2. The claimed ranges and prior art do not overlap but are so close that one skilled in the art would have expected to have the similar reaction condition in the absence of an unexpected result; a *prima facie* case of obviousness may be overcome by a showing of the unexpected result.

Regarding the methyl-t-ether in contact with phosphoric acid , Takahashi et al does teach the use of the acid catalyst such as sulfuric acid , hydrogen fluoride, boron trifluoride or the like may be used extensively in the reaction process (see col. 1 , lines 17-21). Furthermore, Jung et al does mention phosphoric acid (see col. 5 , line 5) in the specification. Therefore, it would have been obvious to the skillful artisan in the art to have motivated to employ phosphoric acid as an acid catalyst for the preparation of methyl pivalate as an alternative to boron trifluoride because Takahashi et al expressly teaches the use of the acid catalyst such as sulfuric acid , hydrogen fluoride, boron trifluoride or the like extensively in the reaction process.

Concerning the molar ratio of methyl pivalate to nonanoic methyl esters being 4 or greater, the references are silent. However, it is possible that the reaction products may contain pivalic acid, methyl pivalate, isononanoic acid, or the like such as nonanoic methyl esters which are prepared from n-butylene, i-butanol, t-butanol, methyl -t-butyl ether or diisobutylene in the presence of hydrogen fluoride as the catalyst (see col. 4, lines 18-22). Regarding the molar ratio of methyl pivalate to nonanoic methyl esters being 4 or greater, the limitation of a process with respect to ranges of pH, time and concentration does not impart patentability to a process when such values are those which would be determined by one of ordinary skill in the art in achieving optimum operation of the process. Concentration is well understood by those of ordinary skill in the art to be a result-effective variable especially when attempting to control selectivity of a chemical process.

Takahashi et al expressly teaches the process of producing the methyl pivalate either by the reaction process using isobutylene or methyl-t-butyl ether (MTBE) with carbon monoxide in the presence of the BF_3 catalyst; they are equivalent during the process. Jung et al is directed to the preparation of carboxylic acid esters by the olefin with carbon monoxide in the presence of the BF_3 alcohol complex catalyst. Therefore, it would have been obvious to the skillful artisan in the art to have motivated to incorporate Jung et al ' BF_3 alcohol complex catalyst' into the Takahashi et al process of producing the methyl pivalate as an alternative because both references are directed to the production of carboxylic acid esters.

Art Unit: 1625

Any inquiry concerning this communications from the examiner should be directed to T. Victor Oh whose telephone number is (703)305-0809. The examiner can be normally reached on Monday through Friday from 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Alan Rotman, can be reached on (703) 308-4698. The fax number for the organization where this application or proceeding is assigned is (703)308-2742.

C
8/19/72

Alan L Rotman

ALAN L. ROTMAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600